

Work Order ID 74675

Wednesday, October 05, 2011 8:29:06 AM



U/R

Page 1

Item ID: D350-748-141TRN

Accept



Setup Start



Revision ID: ~~U/R~~

Stop



Item Name: Crosstube Turning Detail

Start Date: 10/5/2011 Start Qty: 1.00



Cust Item ID:

Required Date: 10/10/2011 Req'd Qty: 1.00



Customer:

Reference:

Approvals:

Process Plan: M.L. J

Date: 11/10/05 Tooling:

Date:

QC:

Date:

SPC (Y/N):

Date:

Run Start



Stop



Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

Draw Nbr

Revision Nbr

D350-748-141

E.U/R OK 11.10.05

100

0.00



MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.00

Mori Seiki CNC Lathe Large

1-Fill tube with sand & install plugs on both ends as per Folio FA648
2-Turn first side as per Folio FA648
3- File transition lines smooth.
FOLIO REV: AA
DWG REV: F

110

QC1- Inspect dimensions to dimension sheet

0.00



QC

Memo

0.00

Quality Control

M.M.L 12/02/08

M.M.L 12/02/08



W/O:		WORK ORDER CHANGES						
DATE	STEP		PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)							
DATE	STEP	Description of NC Section A		Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
				Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

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Page 2

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Item Name: Crosstube Turning Detail

Start Date: 10/5/2011 Start Qty: 1.00



Cust Item ID:

Required Date: 10/10/2011 Req'd Qty: 1.00



Customer:

Reference:

Run Start



Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Stop



QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
120		0.00							
	MORI SEIKI CNC LATHE LARGE								
Mori Seiki	Memo	0.00							
Mori Seiki CNC Lathe Large	1-Turn second side as per Folio FA648 2- File transition lines smooth. 3-Scribe Part & Batch as per Dwg D350-748-141 FOLIO REV: <u> A </u> DWG REV: <u> F </u>								
130		0.00							
	QC1- Inspect dimensions to dimension sheet								
QC	Memo	0.00							
Quality Control									
140		0.00							
	QC8- Inspect parts - second check								
QC	Memo	0.00							
Quality Control									

amm.L 12/02/08

c Ø

amm.L 12/02/08

DP 12-2-8

W/O:		WORK ORDER CHANGES						
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Cust Item ID:

Required Date: 10/10/2011 Req'd Qty: 1.00

Customer:

Reference:

Run Start



Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Stop



QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
150		0.00							
	Large Fab								
Crosstubes	Memo	0.00							
Crosstubes	Grind machining marks								
	★ SEE WID								
160		0.00							
	Outsource process - Heat Treat								
Outsource1	Memo	0.00							
Outsource process - Heat Treat	Issue P/O: <u>16274</u> <u>16353</u> Heat Treat to min 180 KSI As per Dwg D350-748-141 (MIL-T-6736 OR AMS 2759-1C) Sand Blast tube after Heat Treat Possible Supplier: Vac Aero Ensure Certificate of Conformity is attached								
170		0.00							
	Receive & Inspect for Damage & Mat'l Certs								
Packaging	Memo	0.00							
Packaging	Ensure certificate of conformaty is attached								

✓ RM

12-2-11

~~12/02/29~~ 12-03-11

12/4/11

POSITIVE RECALL

EFFECTIVE 12/01/11 AUTH

RELEASED DATE

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

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Page 4

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Revision ID: U/R

Stop



Item Name: Crosstube Turning Detail

Start Date: 10/5/2011 Start Qty: 1.00



Cust Item ID:

Required Date: 10/10/2011 Req'd Qty: 1.00



Customer:

Reference:

Run Start



Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Stop



QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

180

QC6- Inspect dimensions to drawing

0.00



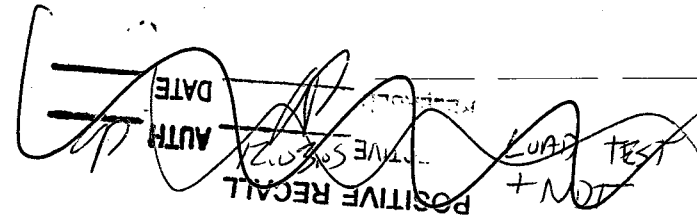
QC

Memo

8/12/2013

0.00

Quality Control



190

Packaging

0.00



Packaging

Memo

0.00

Packaging

Identify and stock in kanban rack
Location: _____

AP 7/6/23

12/5/23

200

QC21- Final Inspection - Work Order Release

0.00



QC

Memo

0.00

Quality Control

12/5/23

mf
12-05-23

W/O:		WORK ORDER CHANGES						
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Picklist Print

Page 1

Wednesday, October 05, 2011 8:29:10 AM

Work Order ID: 74675



Parent Item: D350-748-141TRN



Parent Item Name: Crosstube Turning Detail

Start Date: 10/5/2011

Required Date: 10/10/2011

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A New Issue 08-03-06 DD verified by:ec
 IPP Rev B Removed polish 08.04.02 EC verified by : DD
 IPP Rev C Remove LPS-3 08.06.23 EC verified by DD IPP Rev C
 11.02.24 as per dwg rev.F DD verf: JLM

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D6015-125 		Manufactured	No			110	Each	22.0000	1	1			

Crosstube Material

Location Loc Qty Loc Code

HALL

22

22



72511

1 amm.l 12/02/07

W/O:		WORK ORDER CHANGES						
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Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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NOTE: Date & initial all entries

DART AEROSPACE LTD		Work Order: 74675
Description: Crosstube Assembly (AS350/355 High Fwd)		Part Number: D350-748-141
Inspection Dwg: D350-748-141 Rev: F		Page 1 of 1

FIRST ARTICLE INSPECTION CHECKLIST

Inspection Sheet	Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments	
SIDE A	2.240	+0.005/-0.000	2.245	/		vern	CWC-08	
	2.180	+0.005/-0.000	2.185	/		↓		
	2.180	+0.005/-0.000	2.185	/				
	2.237	+0.005/-0.000	2.240	/				
	2.272	+0.005/-0.000	2.255	/				
	2.306	+0.005/-0.000	2.308	/				
	2.339	+0.007/-0.000	2.244	/				
	2.339	+0.007/-0.000	2.342	/				
	0.062	+/-0.010	0.062	/			vern	CWC-08
	4.26	+/-0.030	4.26	/		"		
	R0.063	+/-0.010	0.063	/		RG		
	R0.50	+/-0.030	500	/		"		
	SIDE B	2.240	+0.005/-0.000	2.245	/		vern	CWC-08
		2.180	+0.005/-0.000	2.185	/		↓	
2.180		+0.005/-0.000	2.184	/				
2.237		+0.005/-0.000	2.241	/				
2.272		+0.005/-0.000	2.275	/				
2.306		+0.005/-0.000	2.308	/				
2.339		+0.007/-0.000	2.344	/				
2.339		+0.007/-0.000	2.343	/				
0.062		+/-0.010	0.062	/		vern		CWC-08
4.26		+/-0.030	4.26	/		"		
R0.063		+/-0.010	0.063	/		RG		
R0.50		+/-0.030	500	/		"		
		110.27	+/-0.060	110.27	/		tape	mm.L-02

Measured by: mmc	Audited by: DD	Preliminary Approval:
Date: 12/02/07	Date: 12-2-8	Date:

Rev	Date	Change	Revised by	Approved
A	06.11.09	New Issue (P/O D350-748-101)	KJ/JLM	
B	07.10.24	Dwg Rev updated	KJ/EC/DD	
C	11.01.20	Dwg Rev updated	KJ	
D	11.07.26	Tolerance revised for 2.339 dimensions	KJ	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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			Initial Chief Eng	Action Description Chief Eng				

NOTE: Date & initial all entries

Item	Qty -141	Part Number	Description
1	X	D350-748-141	CROSSTUBE ASSEMBLY (AS 350/355 HI FWD)
2	1	D6015-125	CROSSTUBE (OR D6017-115)
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6015-125 OR D6017-115
FINISHED LENGTH = 110.270±0.06
- 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: DART PART NUMBER "D350-748-141" AND BATCH NUMBER ON INSIDE OF CUFF
PER DART QSI 044 6.4 (VIBRATING STYLUS)
- 7) WEIGHT: 30.45 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
- 9) BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO
BENDING IS 6% BASED ON O.D.
- 11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING. ACCEPTABLE TO
VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.
- 12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE,
CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE
OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES,
NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY.
CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE
MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO
CRACKING/CHIPPING/GROOVES.
- 14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT
NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.
- 15) MAX TWIST AFTER BENDING: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN
CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.25 (ZN C1-3).

SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
NO. 74675 M.C.5

11/10/05

UNDER REVIEW

RELEASED
2011-01-18

F	ADD HRC TEST OPTION (B8-1) PER PAR 09-040, ADD TWIST LIMIT (A8-1, C1-3), ADD D6015-125 OPTION (C8-1), STOCK DIM NOW MACHINED (D1-4)	CP	10.11.23
E	REVISE GENERAL NOTES; UPDATE TO CURRENT ADD STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A6-3); TOLERANCES (ZN C6-3, D1-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6017-115 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31
REV.	DESCRIPTION	BY	DATE
DESIGN	97	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWN	97		
CHECKED	97	DRAWING NO.	REV. F
MFG. APPR.	97	D350-748-141	SHEET 1 OF 4
APPROVED	97	TITLE	SCALE
DE APPR.	97	CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	10.11.23	COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

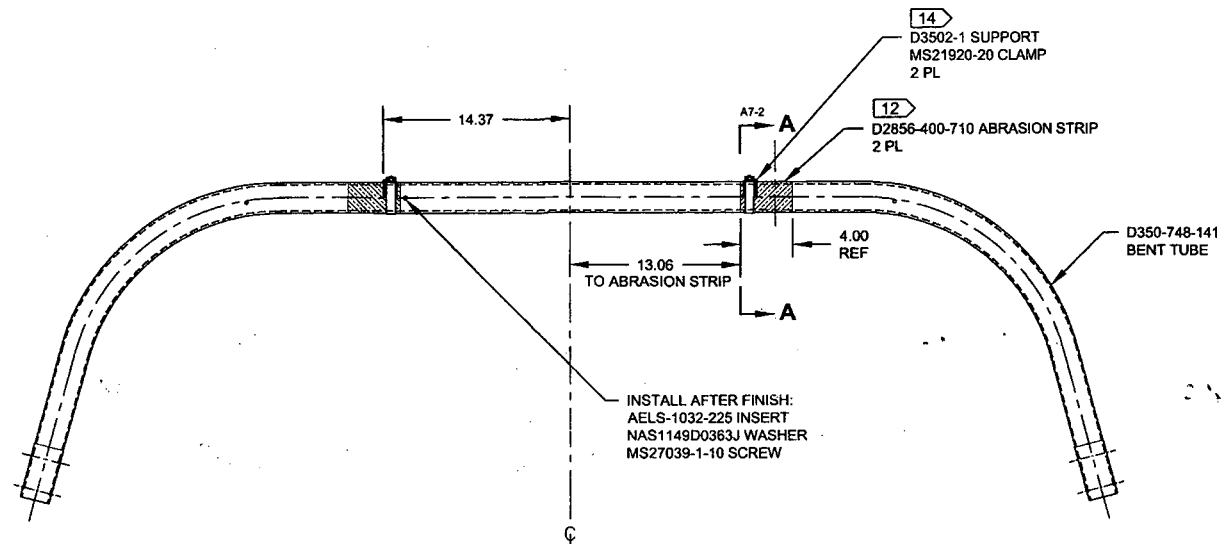
Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

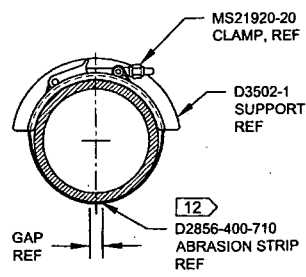
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74675



**D350-748-141
ASSEMBLY DETAIL**



SECTION A-A D4-2
SCALE 4X

UNDER REVIEW
CP 11.07.11

RELEASED
2011-01-30

DESIGN	92	DART AEROSPACE LTD	
DRAWN	92	HAWKESBURY, ONTARIO, CANADA	
CHECKED	92	DRAWING NO.	REV. F
MFG. APPR.	92	D350-748-141	SHEET 2 OF 4
APPROVED	92	TITLE	SCALE
DE APPR.	92	CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	10.11.23	<small>COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.</small>	

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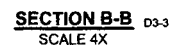
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NOTE: Date & initial all entries

8 7 6 5 4 3 2 1



10



11.07.12

-01- 18

DESIGN	<i>Q</i>	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA DRAWING NO. D350-748-141 TITLE CROSSTUBE (AS 350/355 HI FWD) COPYRIGHT © 2006 BY DART AEROSPACE LTD <small>THIS DOCUMENT IS UNCLASSIFIED AND NOT FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON OR ENTITY WITHOUT WRITTEN PERMISSION. VIOLATION MAY BE A VIOLATION OF THE CANADIAN PATENT ACT.</small>	REV. F
DRAWN	<i>Q</i>		SHEET 3 OF 3
CHECKED	<i>h</i>		
MFG. APPR.	<i>h</i>		
APPROVED	<i>h</i>		
DE APPR.	<i>h</i>		
DATE	10.11.23		SCALE NT

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A horizontal number line with tick marks labeled 1 through 8 from right to left. The line is used to plot the number 5.

W/O:		WORK ORDER CHANGES						
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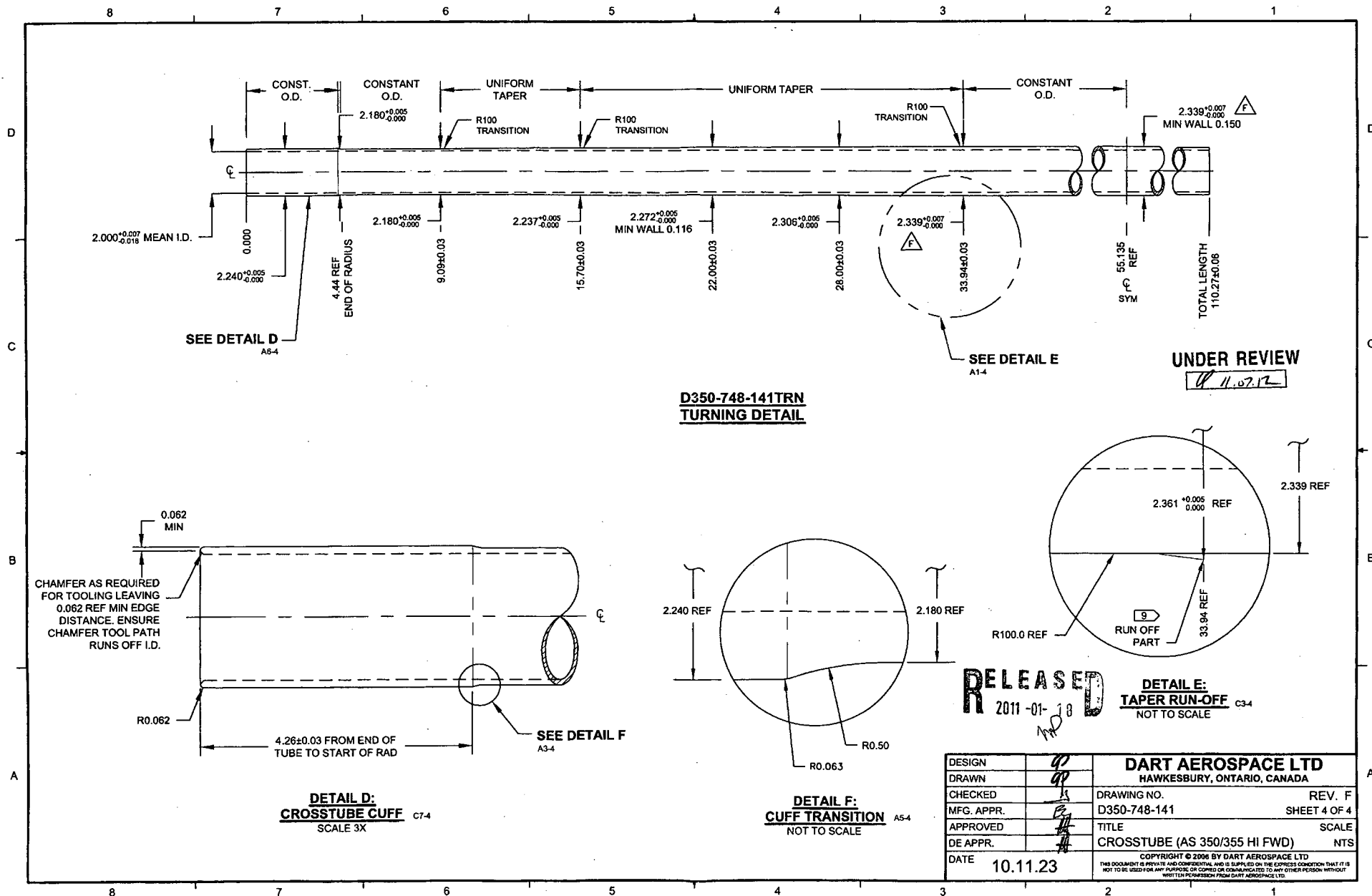
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NOTE: Date & initial all entries

0.031

0.006

0.022

0.003

ULTRA SONIC MEASUREMENTS

Side	LOCATION on tube	R1	R2	R3	R4
A		.125	.180		
		.140	.189		
		.156	.189		
		.144	.183		
B				.130	.181
				.147	.180
				.152	.187
				.138	.183
Part number				350-748-141	
Batch number				74675	
Measured By				MML	

W/O: 74675		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
12.03.05	151	DRILL Ø0.188 TOOLING HOLE THRU CUFF. Qty (1) PER CUFF, 2" FROM END OF CUFF. TOOLING HOLE TOOLING HOLES MUST BE PARALLEL WITH HOLE IN OPPOSITE CUFF. SEE ATTACHED DWG				CP 12.03.05 051042	

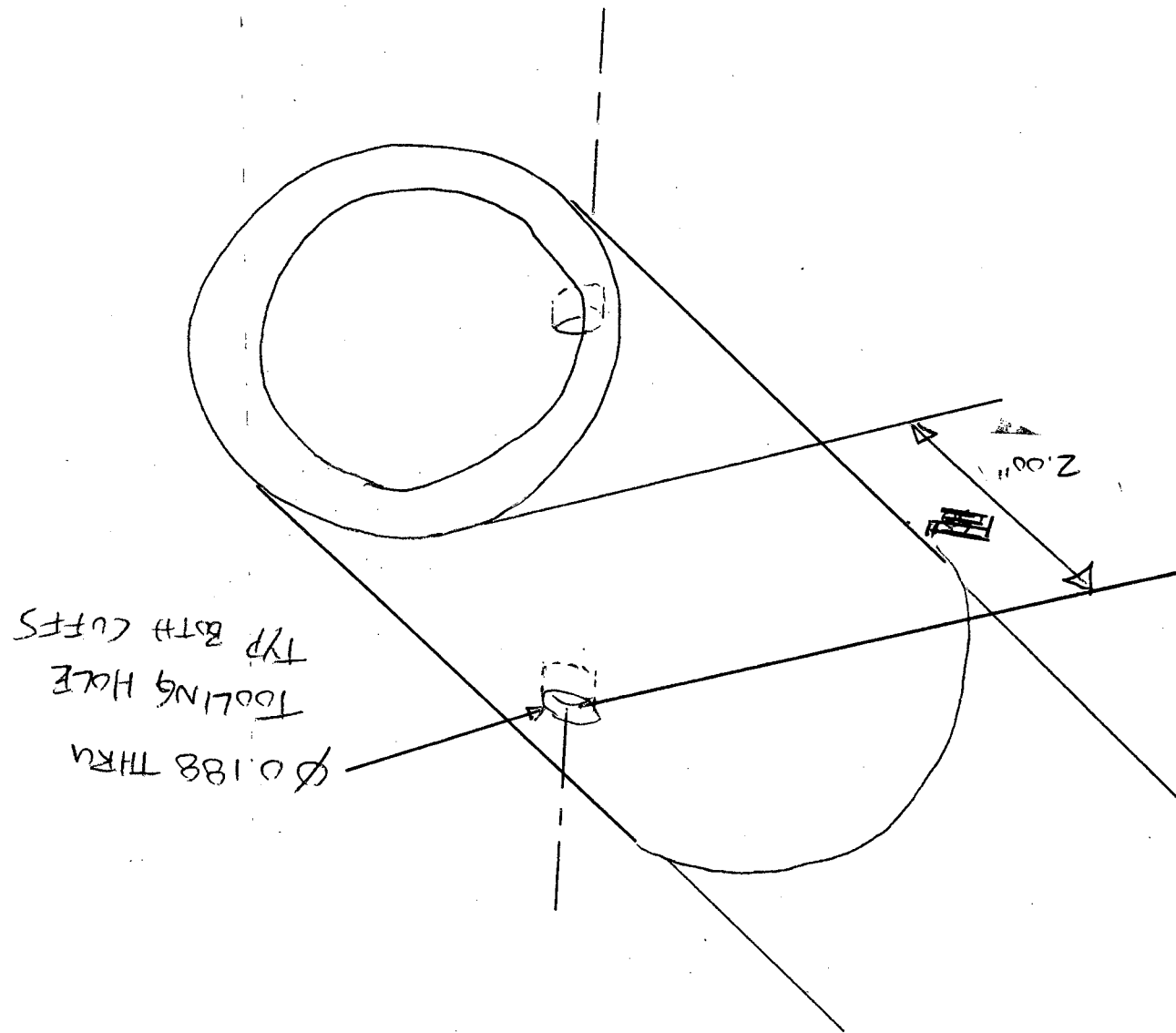
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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

12.03.05





1000 E. Mermald La., Wyndmoor (Phila.) PA 19038-8093
Tel. (215) 233-2600 Fax (215) 233-5653

Certification

SOLD TO

Dart Aerospace Ltd.
1270 Aberdeen Street
Hawkesbury, ON K6A 1K7

March 28, 2012

Metlab Shop Order No:	71502
Purchase Order:	16386
Description:	Crosstube
Part No.:	D350-748-141TRN
Quantity:	4 Pieces
Weight:	160 Pounds
Material:	4130 Alloy Steel
Specifications:	Harden and temper to 180 KSI minimum ultimate tensile strength IAW MIL-T-6736

This is to certify that the above parts were processed as indicated above and conform to the specification requirements.

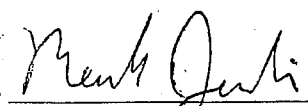
Results:

Ultimate Tensile Strength: 181/188 KSI*

*Converted from 40/41 HRC surface hardness

**Straightness requirement waived by Dart Aerospace Ltd

METLAB


Quality Representative Mark Jenkins

MERCURY CONTAMINATION: During the heat treating process, testing and inspections, the product did not come in direct contact with mercury or any of its compounds nor with any mercury containing device.



Heat Treating and Metallurgical Consulting



1000 E. Mermaid Ln., Wyndmoor (Phila.) PA 19038-8093
Tel. (215) 233-2600 Fax (215) 233-5653

Certification

SOLD TO

Dart Aerospace Ltd.
1270 Aberdeen Street
Hawkesbury, ON K6A 1K7

March 28, 2012

Metlab Shop Order No:	71503
Purchase Order:	16353
Description:	Crosstube
Part No.:	D350-748-141TRN
Quantity:	14 Pieces
Weight:	730 Pounds
Material:	4130 Alloy Steel
Specifications:	Harden and temper to 180 KSI minimum ultimate tensile strength IAW MIL-T-6736

This is to certify that the above parts were processed as indicated above and conform to the specification requirements.


Results:

Ultimate Tensile Strength: 181/188 KSI*

*Converted from 40/41 HRC surface hardness

**Straightness requirement waived by Dart Aerospace Ltd

METLAB


Quality Representative Mark Jenkins

MERCURY CONTAMINATION: During the heat treating process, testing and inspections, the product did not come in direct contact with mercury or any of its compounds nor with any mercury containing device.



Heat Treating and Metallurgical Consulting

